

WHAT IS CLAIMED IS:

1. A method for obtaining biometric identification data for an individual using a sensor and a processor coupled to the sensor, wherein the sensor includes at least fifty thousand piezo ceramic elements arranged in an array and spaced on a pitch equal to or less than approximately two hundred microns, the method comprising:

- (1) placing a biological object of the individual proximate to the piezo ceramic elements of the sensor;
- (2) sensing at least one feature of the biological object with the piezo ceramic elements of the sensor;
- (3) generating an output signal with the sensor that is representative of the at least one feature of the biological object; and
- (4) processing the output signal using the processor to produce data that can be used to identify the individual.

2. The method of claim 1, wherein step (1) comprises:
placing a portion of a finger of the individual proximate to the piezo ceramic elements of the sensor.

3. The method of claim 1, wherein step (1) comprises:
placing a portion of a thumb of the individual proximate to the piezo ceramic elements of the sensor.

4. The method of claim 1, wherein step (1) comprises:
placing a portion of a palm of the individual proximate to the piezo ceramic elements of the sensor.

5. The method of claim 1, wherein step (3) comprises:
generating an output signal that is representative of a print ridge pattern of the biological object.

6. The method of claim 1, wherein step (3) comprises:
generating an output signal that is representative of a bone structure of the biological object.
7. The method of claim 1, wherein step (3) comprises:
generating an output signal that is representative of a blood flow within the biological object.
8. The method of claim 1, wherein step (3) comprises:
generating an output signal based on a discernable impedance difference developed between piezo ceramic elements loaded by ridges of a finger or thumb of the individual and piezo ceramic elements loaded by cavities between ridges of the finger or thumb.
9. The method of claim 1, wherein step (3) comprises:
generating an output signal based on a discernable signal attenuation difference developed between piezo ceramic elements loaded by ridges of a finger or thumb of the individual and piezo ceramic elements loaded by cavities between ridges of the finger or thumb.
10. The method of claim 1, wherein step (4) comprises:
processing the output signal to produce print ridge pattern data that can be used to identify the individual.
11. The method of claim 10, wherein step (4) further comprises:
processing the output signal to produce bone map data that can be used to identify the individual.
12. A method for obtaining biometric identification data for an individual using a biometric apparatus, wherein the biometric apparatus includes a sensor having at least fifty thousand piezo ceramic elements arranged in an array, a multiplexer, and a processor, the multiplexer being switched to couple output signals from the piezo ceramic elements of the sensor to the processor, the method comprising:

- (1) generating an acoustic field with the piezo ceramic elements of the sensor;
- (2) placing a biological object of the individual into the acoustic field;
- (3) sensing a change in the acoustic field caused by the presence of the biological object with the piezo ceramic elements of the sensor;
- (4) switching the multiplexer to couple output signals from the piezo ceramic elements of the sensor to the processor; and
- (5) processing the output signals using the processor to produce data that is representative of at least one feature the biological object.

13. The method of claim 12, wherein step (1) comprises:
generating a sonic energy beam with each of the piezo ceramic elements of the sensor.

14. The method of claim 12, wherein step (1) comprises:
generating a time-varying acoustic field that scans the biological object.

15. The method of claim 12, wherein step (2) comprises:
placing a portion of a finger of the individual into the acoustic field.

16. The method of claim 12, wherein step (2) comprises:
placing a portion of a thumb of the individual into the acoustic field.

17. The method of claim 12, wherein step (2) comprises:
placing a portion of a foot of the individual into the acoustic field.

18. The method of claim 12, wherein step (5) comprises:
processing the output signals to produce print ridge pattern data.

19. The method of claim 12, wherein step (5) comprises:
processing the output signals to produce bone map data.

20. The method of claim 12, wherein step (5) comprises:
processing the output signals to produce blood flow data.

21. A method for obtaining biometric identification data for an individual using a biometric apparatus, wherein the biometric apparatus includes a sensor having a plurality of piezo ceramic elements arranged in an array and a processor, the piezo ceramic elements being spaced on a pitch equal to or less than approximately two hundred microns, the method comprising:

- (1) generating an acoustic field with the piezo ceramic elements of the sensor;
- (2) placing a biological object of the individual into the acoustic field;
- (3) sensing a change in the acoustic field caused by the presence of the biological object with the piezo ceramic elements of the sensor;
- (4) producing an output signal with the sensor based on the sensing step; and
- (5) processing the output signal using the processor to produce data that is representative of the biological object.

22. The method of claim 21, wherein step (1) comprises:
generating a sonic energy beam with each of the piezo ceramic elements of the sensor.

23. The method of claim 21, wherein step (1) comprises:
generating a time-varying acoustic field that scans the biological object.

24. The method of claim 21, wherein step (2) comprises:
placing a portion of a finger of the individual into the acoustic field.

25. The method of claim 21, wherein step (2) comprises:
placing a portion of a thumb of the individual into the acoustic field.

26. The method of claim 21, wherein step (5) comprises:
processing the output signal to produce print ridge pattern data.
27. The method of claim 21, wherein step (5) comprises:
processing the output signal to produce bone map data.
28. The method of claim 21, wherein step (5) comprises:
processing the output signal to produce blood flow data.